Message

From: D'Amico, Louis [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=78A91F83C4414910BE286EFE02004DBC-D'AMICO, LOUIS J.]
Sent: 7/21/2014 3:28:45 PM
To: Katz, Taylor [Katz.Taylor@epa.gov]; Sanchez, Yolanda [Sanchez.Yolanda@epa.gov]
CC: Shams, Dahnish [Shams.Dahnish@epa.gov]
Subject: RE: Blog Update: The Dose Makes the Poison- or does it? (EPA Blog)

The other way would be to look at the categories of blog posts. Several of the ones written by Kacee are under IRIS (the link Taylor provided just sends you to one of them).

Hope this helps.

-Lou

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From: Katz, Taylor
Sent: Monday, July 21, 2014 11:19 AM
To: Sanchez, Yolanda
Cc: D'Amico, Louis; Shams, Dahnish
Subject: RE: Blog Update: The Dose Makes the Poison- or does it? (EPA Blog)

Hello! Here is the link:
http://blog.epa.gov/science/2014/07/the-dose-makes-the-poison-or-does-it/

Best,
Taylor

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From: Sanchez, Yolanda
Sent: Friday, July 18, 2014 7:36 PM
To: Katz, Taylor
Subject: RE: Blog Update: The Dose Makes the Poison- or does it? (EPA Blog)

Taylor, where can the public access Kacee's blogs?

Yolanda Anita Sanchez, MS, MPA
US Environmental Protection Agency || OSWER || **Superfund** || Community Involvement & Program Initiatives Branch
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From: Katz, Taylor
Sent: Friday, July 11, 2014 10:03 AM
To: Sutter, Emma; Scott, Cheryl; Schappelle, Seema; Fritz, Jason; Haque, Mefruz; Zwayer, Bette; Yang, Hui-Min; Wright, Michael; Wright, Barbara; Woodall, George; White, Paul; Wang, Nina; Walsh, Debra; Walker, Teneille; Vulimiri, Suryanarayana; Vinikoor-Imler, Lisa; Vandenberg, John; Troyer, Michael; Suter, Glenn; Strong, Jamie; Spassova, Maria; Sonawane, Bob; Slimak, Michael; Shaw, Denice; Shams, Dahnish; Segal, Deborah; Schlosser, Paul; Sasso, Alan; Sanchez, Yolanda; Samuels, Crystal; Sams, Reeder; Salazar, Matt; Rutigliano, Marian; Ross, Mary; Powers, Christina; Petersen, Dan; Persad, Amanda; Perovich, Gina; Owens, Beth; Olden, Kenneth; Newhouse, Kathleen; Nath, Raghu; Murphy, Patricia; Moore, Danielle; McLanahan, Eva; Marcus, Allan; Makris, Susan; Luke, April; Long, Tom; Lin, Yu-Sheng; Lee, Janice; Kraft, Andrew; Kopylev, Leonid; Knecht, Helen; Keshava, Nagalakshmi; Kadry, Abdel-Razak; Jones, Samantha; Taylor, DebraLynn; Johnson, Maureen; Jinot, Jennifer; Jarabek, Annie; Hotchkiss, Andrew; Hogan, Karen; Hawkins, Belinda; Gwinn, Maureen; Grambsch, Anne; Glenn, Barbara; Gibbons, Catherine; Gehlhaus, Martin; Gatchett, Annette; Gamble, Janet; Galizia, Audrey; Frithsen, Jeff; Frederick, Bob; Flowers, Lynn; Field, Malcolm; Evans, Amanda; Euling, Susan; Deener, Kathleen; D'Amico, Louis; CURTIS, LUCY; Cubbison, Christopher; Corona, Elizabeth; Cogliano, Vincent; Christensen, Krista; Choudhury, Harlal; Chiu, Weihsueh; Carmichael, Brenda; Cai, Christine; Bussard, David; Burgoon, Lyle; Buckley, Barbara; Brinkerhoff, Chris; Boone-Edwards, Amanda; Blessinger, Todd; Birchfield, Norman; Berner, Ted; Bateson, Thomas; Ball, James; Avery, James; Alexander, Laurie; Fite, Katherine
Subject: Blog Update: The Dose Makes the Poison- or does it? (EPA Blog)

The Dose Makes the Poison – or does it?

2014 July 8

By Kacee Deener

When I was a graduate student, one of the first lectures in my toxicology class was about the history and basic principles of toxicology. We learned about Paracelsus, the 16th century physician-alchemist known as the father of toxicology, and how he coined the phrase "the dose makes the poison." This has been a central tenant of toxicology and an important concept in human health risk assessment. The more we learn about the health effects of chemicals, however, the more we realize things may not be quite this simple.

I recently wrote about identifying the hazards of chemicals. Once we know what such hazards are, how do we know what levels of exposure will cause those health effects in humans? This is a really important question. To answer it, scientists do something called dose-response analysis, the next step in the human health risk assessment process. To do this, scientists calculate how different amounts (exposures or doses) of a chemical can impact health effects (responses) in humans.

Scientists measure these amounts both externally (outside the body) and internally (inside the body). External measurements, exposure levels, are the amount of a chemical in an external media, such as air, water, or soil. Internal dose refers to the amount of a chemical that actually gets into a person's body after ingesting or inhaling something (like food or air) that contains the chemical.

Often, as the internal dose or exposure level increases, the response or health effect also increases—though there are exceptions to this. Additionally, sometimes we don't have data about effects at doses lower than what might be tested in studies, so we have to mathematically extrapolate to estimate the effects below the observed data. Traditionally we have done this using different approaches for cancer versus other health effects, but this may change as our scientific understanding of disease processes improves.

Why is dose-response assessment important? First, it helps us understand what happens in the human body at different levels of exposure to a chemical, and it allows us to see that relationship presented graphically. Second, it allows us to derive toxicity values (described in the table below) that become important when we develop a complete risk assessment.

Toxicity Value Name	Description

Reference Dose (oral exposures)	The amount of a substance that one can ingest every day for a lifetime that is not anticipated to cause harmful health effects.
Reference Concentration (inhalation exposures)	The amount of a substance that one can breathe every day for a lifetime that is not anticipated to cause harmful health effects.
Oral Slope Factor	An estimate of the increased cancer risk from a lifetime of oral exposure to a substance.
Inhalation Unit Risk	An estimate of the increased cancer risk from a lifetime of inhalation exposure to a substance.

We want to make sure we are protective of sensitive groups of people when we calculate toxicity values. To do that we may apply scientifically-based factors to account for uncertainty in various areas, such as differences between animals and humans (if we start with animal data), differences among humans (such as genetics, life stages, etc.), and scientific data gaps (for example, certain health endpoints that have not been evaluated). In EPA's Integrated Risk Information System (IRIS) Program, we've started developing multiple toxicity values for different organ systems or health effects seen in the data.

The toxicity values resulting from dose-response assessment are used as part of a larger calculation to estimate risk from exposure to environmental contaminants. I'll talk more about that in a few weeks. Until then, check out an example of dose-response assessment in Section 2 of the IRIS assessment of benzo[a]pyrene. And read more about dose-response assessment on the Agency's risk assessment website.

About the Author: Kacee Deener is the Communications Director in EPA's National Center for Environmental Assessment. She joined EPA 13 years ago and has a Masters degree in Public Health.

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